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For Further Information

Contact Mr. Michael Gillenwater, Environmental Protection Agency, (202) 564-4092, gillenwater.michael@epa.gov

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Non-Energy Uses of Fossil Fuels

The products and production processes pictured on the front and back cover of this report depict non-energy uses of fossil fuels. Rather than being combusted for energy, fuels consumed for non-energy purposes act as building blocks or reagents in fabricating other materials. These fossil fuel-derived materials are important from an emissions perspective since they often provide long-term storage of a portion of the fuel's carbon.



Refinery: Crude oil is a mixture of many hydrocarbon chains of various lengths. Refineries process crude oil by distillation, separating the fuel into its hydrocarbon components according to their boiling points and molecular weights. The oil “fractions” are further reacted through such processes as catalytic cracking and hydroprocessing to form the petrochemical feedstocks that serve as the building blocks of synthetic products.



Plastics: Monomers derived from oil and natural gas are reacted to form polymeric resins for use as plastics. Plastics store this fossil fuel carbon during their lifetime and, if recycled or landfilled, they can continue to act to store carbon.



Asphalt: Asphalt is a product of the crude oil fractions with high boiling points and molecular weights. These “heavy” fractions are mixed with rock aggregate when laid on roads and highways, storing the fossil fuel carbon.



Textiles: Like plastics, synthetic fibers such as polyester, nylon, and acrylic are made from polymeric resins derived from fossil fuels. The resins are spun into fibers that can be used in clothing, furniture, safety equipment, and building materials. These products can also act to store their fossil fuel carbon.



Iron and Steel Production: In iron and steel foundries, coking coal is used as a reducing agent during the production of the metal. Although a portion of the coal's carbon is combusted and released to the atmosphere as carbon dioxide, its role as a chemical reagent makes it an example of a non-energy use of fossil fuel.



Fertilizer: Natural gas is used in the production of ammonia, the key component of most nitrogenous fertilizers. Through catalytic steam reforming, natural gas is broken down into carbon dioxide, which is emitted to the atmosphere, and hydrogen, which is combined with nitrogen to make ammonia.



Scrap Tires: Tires are made from synthetic rubber and carbon black, both products of fossil fuels. Like plastics and synthetic fibers, storage of the carbon in tires is dependent upon the ultimate fate of the product.



Paint Resin: Paint resin is another example of a product derived from the non-energy use of fossil fuels. Petrochemical products with a myriad of formulations and uses are produced in the industrial sector, including lubricants, solvents, and waxes. Carbon is both stored by and emitted from these products.